WHAT IS CLAIMED IS:

1. A frequency synthesizer comprising:

a voltage controlled oscillator having a terminal for oscillating a signal whose frequency corresponds to a control signal applied to the terminal;

a first frequency divider for dividing the frequency of the signal outputted from the voltage controlled oscillator so as to output a first frequency-divided signal, said first frequency-divided signal having a divided frequency;

a comparator for comparing a phase of the first frequency-divided signal with that of a reference signal so as to output a difference signal representing a difference between the phase of the first frequency-divided signal and that of the reference signal;

a loop filter for smoothing the difference signal outputted from the comparator so as to output the smoothed signal as the control signal to the terminal of the voltage controlled oscillator;

a frequency division unit for dividing the frequency of the signal outputted from the voltage control oscillator so as to output a second frequency-divided signal, said second frequency-divided signal having a divided frequency; and

a mixer unit for mixing the second frequency-divided signal outputted from the frequency division unit and the signal outputted from the voltage control oscillator so as to output a mixed signal.

2. A frequency synthesizer according to claim 1, wherein said

frequency division unit comprises a second frequency divider for dividing the frequency of the signal outputted from the voltage control oscillator.

3. A frequency synthesizer according to claim 2, wherein said second frequency divider divides the frequency of the signal outputted from the voltage control oscillator on the basis of a frequency division ratio, said second frequency divider switchably setting the frequency division ratio.

4. A frequency synthesizer according to claim 1, wherein said first frequency divider comprises a pre-scalar for dividing the frequency of the signal outputted from the voltage control oscillator and a third frequency divider connected therewith in series, said third frequency divider being adapted to divide an output signal outputted from the pre-scalar, said pre-scalar being served as the frequency division unit so as to supply the signal outputted from the pre-scalar to the mixer unit.

5. A frequency synthesizer according to claim 1, wherein said mixer unit comprising:

a first phase shifter adapted to generate first and second signals, said first signal being shifted 90 degree away from the second signal;

a second phase shifter adapted to generate third and fourth signals, said third signal being shifted 90 degree away from the fourth signal;

a first mixer adapted to mix one of the first and second signals outputted from the first phase shifter and one of the third and fourth signals outputted from the second phase shifter;

a second mixer adapted to mix other of the first and second signals

outputted from the first phase shifter and other of the third and fourth signals outputted from the second phase shifter; and

an adder adapted to add a mixed signal by the first mixer and a mixed signal by the second mixer.

6. A frequency synthesizer according to claim 1, wherein said mixer unit is switchably served as an upconvert mixer and a downconvert mixer according to a control signal from an outside.

7. A frequency synthesizer according to claim 1, wherein said frequency division unit has a frequency division ratio, said frequency division ratio being a secured value.

8. A frequency synthesizer according to claim 1, wherein said frequency division unit has a frequency division ratio for temporally varying the frequency division ratio so as to set an averaged value from the temporally varied frequency division ratios to a desired frequency division ratio.

9. A method of generating a frequency divided signal, comprising the steps of:

oscillating by a voltage controlled oscillator a signal whose frequency corresponds to a control signal, said voltage controlled oscillator having a terminal, said control signal being applied to the terminal;

dividing by a first frequency divider the frequency of the signal outputted from the voltage controlled oscillator so as to output a divided

signal, said divided signal having a divided frequency;

comparing by a comparator a phase of the divided signal with that of a reference signal so as to output a difference signal representing a difference between the phase of the divided signal and that of the reference signal;

smoothing the difference signal outputted from the comparator so as to supply the smoothed signal as the control signal to the terminal of the voltage controlled oscillator; and

mixing by a mixer unit a frequency-divided signal and the signal outputted from the voltage control oscillator so as to output a mixed signal, said frequency-divided signal being obtained by dividing the frequency of the signal outputted from the voltage controlled oscillator

10. A method of generating a frequency divided signal according to claim 9, further comprising a step of dividing by a second frequency divider the frequency of the signal outputted from the voltage control oscillator so as to supply a signal outputted from the second frequency divider as the frequency-divided signal to the mixer unit.

11. A method of generating a frequency divided signal according to claim 10, further comprising a step of switching a frequency division ratio of the second frequency divider so as to vary a frequency band of the mixed signal outputted from the mixer unit.

12. A method of generating a frequency divided signal according to claim 9, wherein said first frequency divider comprises a pre-scalar and a

third frequency divider, further comprising the steps of:

dividing by the pre-scalar the frequency of the signal outputted from the voltage control oscillator;

dividing by the third frequency divider a frequency of an output signal outputted from the pre-scalar so as to supply the divided signal to the phase comparator; and

supplying the output signal outputted from the pre-scalar as the frequency-divided signal to the mixer unit.

13. A method of generating a frequency divided signal according to claim 9, wherein said mixer unit comprises a first shifter, a second shifter, a first mixer, a second mixer and an adder, wherein said mixing step comprising the steps of:

generating by the first phase shifter first and second signals, said first signal being shifted 90 degree away from the second signal;

generating by the second phase shifter third and fourth signals, said third signal being shifted 90 degree away from the fourth signal;

mixing by the first mixer one of the first and second signals outputted from the first phase shifter and one of the third and fourth signals outputted from the second phase shifter;

mixing by the second mixer other of the first and second signals outputted from the first phase shifter and other of the third and fourth signals outputted from the second phase shifter; and

adding by the adder a mixed signal outputted from the first mixer and a mixed signal outputted from the second mixer.

14. A method of generating a frequency divided signal according to claim 9, further comprising the step of switching the first mixer into an operation mode of an upconvert mixer and that of a downconvert mode so as to vary a frequency band of the mixed signal outputted from the first mixer.

15. A method of generating a frequency divided signal according to claim 14, wherein said second frequency divider has a frequency division ratio, said frequency division ratio being a secured value.

16. A method of generating a frequency divided signal according to claim 9, wherein said wherein said first frequency divider has a frequency division ratio for temporally varying the frequency division ratio so as to set an averaged value from the temporally varied frequency division ratios to a desired frequency division ratio.

17. A mobile radio device installing therein the frequency synthesizer according to claim 1.